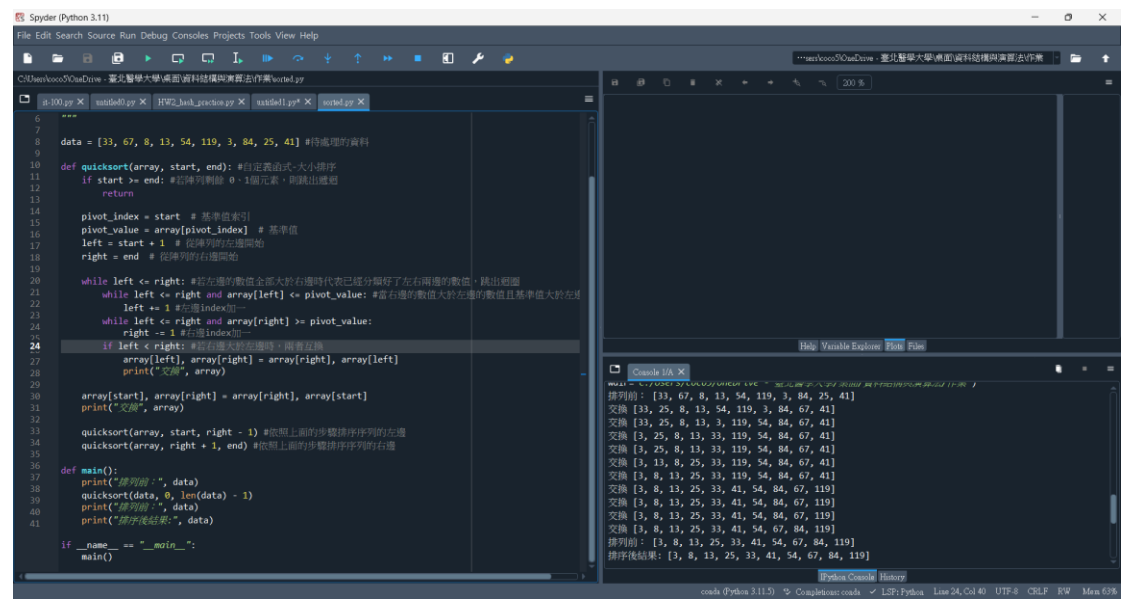


執行結果



The image shows the Spyder Python IDE interface. The editor window displays a Python script implementing the quicksort algorithm. The script defines a `quicksort` function that takes an array, start, and end indices as arguments. It uses a pivot value to partition the array into two sub-arrays and recursively sorts them. The `main` function calls `quicksort` on the initial data and prints the sorted result.

```
6 ***
7
8 data = [33, 67, 8, 13, 54, 119, 3, 84, 25, 41] #待處理的資料
9
10 def quicksort(array, start, end): #自定義遞式-大小遞降
11     if start >= end: #此陣列剩餘 0 - 1個元素，則跳出遞迴
12         return
13
14     pivot_index = start # 基準值索引
15     pivot_value = array[pivot_index] # 基準值
16     left = start + 1 # 從陣列的左邊開始
17     right = end # 從陣列的右邊開始
18
19     while left <= right: #若左邊的數值全部大於右邊時代表已經分好了左右兩邊的數值，跳出迴圈
20         while left <= right and array[left] <= pivot_value: #當左邊的數值大於右邊的數值且基準值大於左邊
21             left += 1 #左邊index加一
22         while left <= right and array[right] >= pivot_value:
23             right -= 1 #右邊index加一
24         if left < right: #當左邊大於右邊時，兩者互換
25             array[left], array[right] = array[right], array[left]
26             print("交換", array)
27
28     array[start], array[right] = array[right], array[start]
29     print("交換", array)
30
31     quicksort(array, start, right - 1) #依照上面的步驟排序序列的左邊
32     quicksort(array, right + 1, end) #依照上面的步驟排序序列的右邊
33
34
35
36 def main():
37     print("陣列前:", data)
38     quicksort(data, 0, len(data) - 1)
39     print("陣列前:", data)
40     print("陣列後結果:", data)
41
42 if __name__ == "__main__":
43     main()
```

The console window shows the execution output, which includes the initial array, the steps of the algorithm (swaps and recursive calls), and the final sorted array.

```
main = <function main at 0x0000000000000000>
陣列前: [33, 67, 8, 13, 54, 119, 3, 84, 25, 41]
交換 [33, 25, 8, 13, 54, 119, 3, 84, 67, 41]
交換 [33, 25, 8, 13, 3, 119, 54, 84, 67, 41]
交換 [3, 25, 8, 13, 33, 119, 54, 84, 67, 41]
交換 [3, 25, 8, 13, 33, 119, 54, 84, 67, 41]
交換 [3, 13, 8, 25, 33, 119, 54, 84, 67, 41]
交換 [3, 8, 13, 25, 33, 119, 54, 84, 67, 41]
交換 [3, 8, 13, 25, 33, 41, 54, 84, 67, 119]
交換 [3, 8, 13, 25, 33, 41, 54, 84, 67, 119]
交換 [3, 8, 13, 25, 33, 41, 54, 67, 84, 119]
交換 [3, 8, 13, 25, 33, 41, 54, 67, 84, 119]
陣列前: [3, 8, 13, 25, 33, 41, 54, 67, 84, 119]
排序後結果: [3, 8, 13, 25, 33, 41, 54, 67, 84, 119]
```